heat exchanger 40 is directed to topping heater 20 through a steam line 46. Topping heater 20 heats the output from regenerative heat exchanger 40 to at least 850°C. High temperature water cracking system 18 uses the steam heated to at least 850°C as a feed to produce oxygen and hydrogen. Water cracking system 18 can be any known high temperature water cracking system that uses heat energy to disassociate water into hydrogen and oxygen.

IN THE CLAIMS

1. (amended) A system for generating hydrogen comprising:

feed water;

a liquid metal nuclear reactor having a non-radioactive secondary heat loop;

a steam generator connected to said secondary heat loop, said steam generator capable of raising the temperature of said feed water;

a high temperature water cracking system, said feed water coupled to said water cracking system by a feed water input line; and

a topping heater, said topping heater capable of raising the temperature of said feed water, said feed water input line coupled to said steam generator, said topping heater, and said high temperature water cracking system.

25. (amended) A system for generating hydrogen comprising:

feed water;

a liquid metal nuclear reactor having a non-radioactive secondary heat loop;

a steam generator connected to said secondary heat loop, said steam generator capable of raising the temperature of said feed water to between about 450°C to about 550°C;